ABSTRACT

Methods for deriving adult pluripotent stem cells from fully differentiated adult somatic cells by *in vitro* nuclear remodeling are provided. Cells cultured from a variety of tissue sources are treated *in vitro* to reverse the tissue specific epigenetic chromosomal changes associated with differentiation. Remodeled cells resemble embryonic stem cells by expressing telomerase and demonstrating pluripotency. The cells can be genetically modified to produce heterologous proteins or to correct for genetic defects. Methods for treating a human by implanting in vitro-derived adult pluripotent stem cells ("NUCREM™ cells") and generating engineered tissues for implantation are also disclosed. Advantages to this invention include the non-use of embryos to obtain an unlimited supply of stem cells for therapy and the ability to generate autologous cells and tissues for therapeutic use.